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Helminth parasites of unbred fishes in a pond husbandry

Helminthofauna ryb nieużytkowych w gospodarstwie stawowym

On the background of the modest native literature concerning the helminthofauna of cyprinid fishes both of the natural reservoirs and artificial ones, the attention is drawn by the lack of elaborations of the sets of species of parasitic worms of those fishes in breeding reservoirs, which are seldom the object of fish breeding. To the native authors who took interest in the helminthofauna of the cyprinid fishes belong Milicer (1938), Prost (1951), Janiszewska (1954), Kozicka (1951, 1958, 1959), and others.

From the economical point of view these informations concerning the helminthofauna of cyprinid fishes, which most commonly constitute the undesirable admixture in pond husbandries, are of essential importance because they may become a source of a parasitic invasion to the bred fish.

Bearing this in mind I found it purposeful to undertake studies on the helminthofauna of unbred cyprinid fishes in a pond husbandry (carp breeding). In connection with this I examined during the autumn — spring period 1957/1958 a total number of 136 fishes caught in the largest carp breeding pond in the Lublin Palatinate, that is in Siemień (about 402 ha area). The fishes belonged to three most numerous represented species of the family *Cyprinidae* in the pond: (1) *Leuciscus idus* L. — 51 specimens, (2) *Rutilus rutilus* L. — 46 specimens, and (3) *Leucaspisus delineatus* Heck. — 38 specimens.

In the course of the present studies total helminthological dissections were conducted. The species of the parasitic worms found in the separate hosts, as well as the extensity and intensity of invasion, are shown in Table I.

Table I

Host species	examined	invaded	Parasite species	Extensivity		Intens.
				invad.	%	
<i>Leucaspis delineatus</i>	38	24	<i>Tylodelphys clavata</i>	7	18	1 — 2
			<i>Sphaerostomum globiporum</i>	3	8	1 — 2
			<i>Caryophyllaeides fennica</i>	1	3	2
			<i>Schistocephalus solidus</i>	3	8	1
			<i>Rhaphidascaris acus</i>	13	34	1 — 3
<i>Leuciscus idus</i>	51	18	<i>Tylodelphys clavata</i>	11	22	1 — 7
			<i>Diplostomum</i> sp.	2	4	1 — 2
			<i>Caryophyllaeides fennica</i>	3	6	1
			<i>Schistocephalus solidus</i>	2	4	1 — 2
			<i>Acanthocephalus anguillae</i>	2	4	1
<i>Rutilus rutilus</i>	46	20	<i>Tylodelphys clavata</i>	12	26	1 — 4
			<i>Sphaerostomum brahamae</i>	4	9	1 — 3
			<i>Caryophyllaeides fennica</i>	3	7	1
			<i>Rhaphidascaris acus</i>	3	7	1

Systematic review of the collected parasites

TREMATODA

Sphaerostomum brahamae (O. F. Müller, 1776) Szidat, 1944

Syn.: *Fasciola brahamae* Müller, 1776; *Sphaerostomum brahamae* (Müller, 1776) Lühe in part.

This species was found only in *Rutilus rutilus* caught in the spring. It occurred in the intestine, in numbers ranging from 2 — 3 specimens in one individual. Out of the total number of 46 fishes I found the parasite in 4, what makes 9% of the total invasion of the host species. I found mainly young forms, however all of them possessed already developed eggs in uterus.

The described species is a common and typical parasite of cyprinid fishes widely distributed in West Europe and in the U.S.S.R. (Markievič, 1951).

In Poland it was among others recorded in *Rutilus rutilus* by Ruszkowski (1925) from Vistula near Warsaw, by Dąbrowska

(1926) from the middle course of Vistula, and by Milicer (1938) from the lake Wigry — as *Sphaerostomum brahamae* sensu lato. Kozicka (1958), however, found *S. brahamae* sensu Szidat, 1944 in *Abramis brama* Cuv., *Blicca björkna* (L.), *Vimba vimba* (L.), *Esox lucius* L. (species of fishes collected in Vistula and lakes: Družno, Mamry, Gołdapiwo).

Markowski (1933) recorded the occurrence of *S. brahamae* also in *Anguilla anguilla* L., but this species, according to Szidat was mistakenly determined by the author and the description concerns not only another species but even another genus (Ślusarski, 1958).

Sphaerostomum globiporum (Rudolphi, 1802) Szidat, 1944

Syn.: *Fasciola globipora* Rudolphi, 1802; *Distoma globiporum* (Rudolphi) Looss, 1894 in part.; *Sphaerostomum globiporum* (Rudolphi) Looss, 1899 in part.

I found this trematode only in *Leucaspis delineatus* in the intestine. It should be stressed that I found the parasite only in fishes caught in spring in spite of the fact that the majority of them was collected in autumn. The extensity of invasion was relatively low, limited to 8%, an evidence that *S. globiporum* is not a frequent parasite in the examined water reservoir. The intensity of the invasion also low, 1 — 2 specimens.

Outside Poland *S. globiporum* in the new presentation was found only by Szidat in *Rutilus rutilus* in the Kuron Bay (cited after Ślusarski, 1958).

In Poland this species was described only by Ślusarski (1958) in *Salmo* sp. of the river Wda, and by Kozicka (1959) in *Misgurnus fossilis*, *Scardinius erythrophthalmus* and *Rutilus rutilus* from the lakes: Družno, Gołdapiwo, Mamry północne and from Vistula near Płock.

Tylodelphys clavata (v. Nordmann, 1832) Diesing, 1850 —
metacercaria

Syn.: *Diplostomum clavatum* Nordmann, 1832; *Tylodelphys clavata* Diesing, 1850; *Tetracotyle clavata* Matare, 1910; *Proalaria clavata* Ciurea, 1928; *Prodipllostomum clavatum* Ciurea, 1933.

The metacercaria of *Tylodelphys clavata* occurred in all the species of fish examined by me in the vitreous body of the eyeball.

The intensity of invasion ranged from 1 — 7 metacercariae in one eye of the host, and the extensity — 18% for *Leucaspius delineatus*, 26% for *Rutilus rutilus*, and 22% for *Leuciscus idus*.

The species occurs in many hosts and is of wide geographical distribution. Occurs in fresh-water fishes in Europe, Asia, North America (Markevič, 1951).

In Poland *T. clavata* was recorded by Milicer (1938) in *Rutilus rutilus* L., *Abramis brama* L., *Blicca björkna* L., *Perca fluviatilis* L., *Acerina cernua* L., from the lake Wigry. Kozicka (1958) describes this species in near twenty species of fishes of the lake Družno, and names as typical host *Rutilus rutilus* besides *Perca fluviatilis* and *Acerina cernua*.

Diplostomum sp. — metacercaria

(Fig. 1)

In the vitreous body of the eye I found in two *Leuciscus idus* L. in spring, together with the metacercaria of *Tylodelphys clavata*, three specimens of metacercaria of the genus *Diplostomum*. Diagnostic difficulties to determine the species force me to present their description and some biometric data.

The body oval without a distinct division into the front and hind parts. Dimensions of larvae range within the limits 0.368 — 0.456 × 0.223 — 0.240 mm. Oral sucker of the diameter 0.0462 —

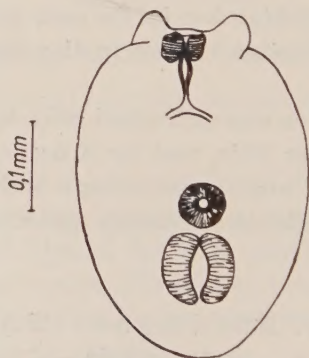


Fig. 1. *Diplostomum* sp. — metacercaria

0.0495 mm surrounded by two collar-like processes. Ventral sucker located in the posterior half of the body, somewhat smaller than the oral, its diameter fluctuates within the limits 0.0363 — 0.0396 mm.

Close to the ventral sucker there is located the holdfast bell, almost round, its size $0.0957 \times 0.0792 - 0.0825$ mm. Behind the oral sucker lies the pharynx of the mean dimensions 0.0198×0.0165 mm. The short oesophagus passes into the bifurcated intestine, the further course of which was difficult to trace in the available preparations.

The morphological structure of the body and the dimensions of larvae described by me as *Diplostomum* sp. are very close to the corresponding data of the metacercaria of *Diplostomum spathaceum* (Rudolphi, 1819) [after Markevič, 1951 — *Diplostomulum spathaceum* (Rudolphi, 1819)]. However, in my material the ventral sucker is located closer to the posterior end of the body.

CESTODA

Caryophyllaeides fennica (Schneider, 1902) Nybelin, 1922

Syn.: *Caryophyllaeus mutabilis* (Olsson, 1893) Nufer, 1905; *Caryophyllaeus fennicus* Schneider, 1902.

In my material I found this tapeworm in the intestine in all the three species of the examined fishes. However, it occurred not numerously, because the degree of invasion was in *Leucaspilus delineatus* 3%, in *Rutilus rutilus* 7% and in *Leuciscus idus* 6%. The intensity of invasion was 1 — 2 specimens.

C. fennica was recorded in *Cyprinidae*, *Chondrostoma nasus* L. and *Squalius cephalus* Kessler in the following countries in Europe: Finland, Sweden, France and Switzerland.

In Poland it was recorded for the first time by Janiszewska (1954) in *Leuciscus rutilus* L. from Odra and in *Barbus barbus* L. and *B. petenyi* Heck. in Vistula. It was also recorded by Kozicka (1959) in *Abramis brama* L. and *Blicca björkna* L., as a little typical for the biocenosis of fishes of the lake Družno.

Schistocephalus solidus (O. F. Müller, 1776) — plerocercoid

Syn. of larval stadium: *Taenia* Frisch, 1734; *Hirudo depressa alba* L., 1745; *Fasciola hepatica* L., 1758 et 1767; *Taenia lata* Pallas, 1761; *Taenia solida* Müller, 1776; *Taenia gasterostei* Fabricius, 1780; *Taenia acutissima* Pallas, 1781; *Rhytis solida* Zeder, 1800 et 1803; *Bothriocephalus solidus* (Müller, 1776) Rudolphi, 1810 et 1819; *Schistocephalus dimorphus* Creplin, 1829; *Schistocephalus rhynchichthydis* Diesing, 1863; *Schistorhynchus dimorphus* Zschokke, 1896; *Schistocephalus solidus* (Müller, 1776) Steenstrup, 1857; *Schistocephalus gasterostei* (Fabricius) Lühe, 1910.

S. solidus was found by me in the body cavity in *Leucaspilus delineatus* Heck and in *Leuciscus idus*. Hitherto the plerocerooid of this species was not recorded in fishes of the family Cyprinidae. The extensity of invasion of the described parasite was relatively low; in *Leucaspilus delineatus* it reached 8%, and in *Leuciscus idus* barely 4%. The intensity of invasion was from 1—2 specimens.

The larval form (plerocercoid) of parasite was hitherto recorded in Western Europe, Greenland, U.S.S.R. and U.S.A. in the following hosts: *Gasterosteus aculeatus* L., *Gasterosteus pungitius* L., *Gasterosteus cataphractus* Pall., *Cottus bairdii*, *C. Gobio* L., *C. poecilopus* Heck., *Rhynchichthys gronovii* Cuv., *Uraniidea formosa* De Kay (Vik, 1954). Neveu-Lemaire (1936) reports that the plerocercoids of this species were also found in the intestine of the salmon, trout, eel and bullhead.

In Poland it was described by Ruszkowski (1925—1933) in *Gasterosteus aculeatus* L. in Vistula, and Milicer (1938) also in *Gasterosteus aculeatus* L. in the lake Wigry.

NEMATODA

Raphidascaris acus (Bloch, 1779) Railliet et Henry, 1915 — larva

Syn.: *Ascaris acus* Bloch, 1779; *Ascaris piscicola* Linstow, 1878.

In my material the larvae of *Rh. acus* occurred in two species: *Leucaspilus delineatus* and *Rutilus rutilus* in the liver and in the intestine as free forms, and as incysted form in the body cavity and in the mucous membrane of the intestine. The intensity of invasion from 1—3 specimens. The extensity reached 7% in *Rutilus rutilus* and 34% in *Leucaspilus delineatus*.

This species is widely distributed and is recorded in Africa, U.S.A., U.S.S.R., Italy, Austria, England. It occurs as larval form typically in cyprinid and clupeid fishes (according to Markevič, 1951 in cyprinid, salmonid and percid and as mature form in the pike and other voracious fishes.

In Poland recorded among others by Markowski (1933) in *Anguilla anguilla* L. from the Baltic Sea, Milicer (1938) in *Esox lucius* L. from the lake Wigry, and by Kozicka (1959) in *Esox lucius* L. and *Anguilla anguilla* L. from the lake Družno.

ACANTHOCEPHALA

Acanthocephalus anguillae (Müller, 1787) Lühe, 1911

Syn.: *Echinorhynchus anguillae* Müller, 1787; *Echinorhynchus globosus* Rudolphi, 1809; *E. linstowi* Hamann, 1892; *E. proteus* Port p. p; *E. propinquus* Mühling nec. Dujardin, 1845.

In my material it is found in the intestine of *Leuciscus idus*. It belongs to a rare parasite of fish in the examined water reservoir, because it occurred there in 4% (2 specimens) of the invaded fishes, one in each fish.

Widely distributed in the U.S.S.R., recorded also in West Europe and in North America in the following hosts: *Abramis brama* C v; *A. ballerus* L., *Alburnus alburnus* L., *Acipenser huso* L., *A. ruthenus* L., *A. rubicundus* L., *Acerina cernua* L., *Anguilla anguilla* L., *A. chrysypa* L., *Aspius aspius* L., *Barbus barbus* L., *Blicca björkna* L., *Carassius carassius* Bloch, *Coregonus lavaretus* L., *C. muksum* L., *Cyprinus carpio* L., *Esox lucius* L., *Lucioperca lucioperca* L., *Perca fluviatilis* L., *Rutilus rutilus* L., *Salmo fontinalis* Mitch., *S. irideus* Gibb., *Scardinius erythrophthalmus* L., *Vimba vimba* L., *Zoarces viviparus* L.

In Poland *A. anguillae* was recorded by Kozicka (1951, 1959) in *Abramis brama* L., from the Vistula and from the lake Družno, and by Malanowski (1951) in *Barbus barbus* L. from the Vistula.

General notes

(1) The general extensity of invasion with the parasitic worms in the separate species of fishes was: in *Leucaspilus delineatus* Heck. 63% in *Rutilus rutilus* L. 43%, and in *Leuciscus idus* L. 35%.

(2) The majority of parasites found by me in the examined fishes was described by some authors also in carp (Lajman, 1949, Petročenko, 1956 and others). This fact offers a basis to presume that the parasitic invasions may get transferred from the unbred to the bred fishes.

(3) For the species *Schistocephalus solidus* (plerocercoid) I found new, hitherto not recorded, intermediate hosts: they are *Leucaspilus delineatus* Heck. and *Leuciscus idus* L. from the family Cyprinidae.

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STRESZCZENIE

W okresie jesienno-wiosennym 1957/58 zbadano 136 ryb, należących do tzw. chwastu rybiego w jeziorze Siemień. Zbadano: 51 egz. *Leuciscus idus* L. (jaź), 46 egz. *Rutilus rutilus* L. (płóc) i 38 egz. *Leucaspis delineatus* Heck. (słonecznica).

Stwierdzono następujące gatunki pasożytów: *Sphaerostomum brahamae* (Müller 1776), *Sph. globiporum* (Rudolphi, 1802), *Tylodelphys clavata* (Nordmann, 1832) — metacerkaria, *Diplostomum* sp. — metacerkaria, *Caryophyllaeides fennica* (Schneider, 1902), *Schistocephalus solidus* (Müller, 1776) — plerocerkoid, *Rhaphidascaris acus* (Bloch, 1779) — larwa oraz *Acanthocephalus anguillae* (Müller, 1787).

Dla plerocerkoida *Schistocephalus solidus* stwierdzono nowych żywicieli (pośrednich): *Leucaspis delineatus* Heck. i *Leuciscus idus* L. z rodziny Cyprinidae.

